

Claims

I claim:

1. In a vehicle having an engine and including a plurality of motors, each transmitting motion to a respective device, and which are connected to a pump for delivering a flow of hydraulic fluid to at least a first motor in a series of motors, a circuit for controlling that flow of the hydraulic fluid to the series of motors so as to permit their simultaneous or individual operation, the circuit comprising:
 - a) an inlet through which fluid supplied to the first motor is passed;
 - b) an outlet through which the fluid may exit so as to be available for return to the system;
 - c) a first and second switching means, each having a first and second position, the fluid being restricted from flowing between the inlet and outlet when the switching means are in their first position and unrestricted therebetween when the switching means are in their second position;
 - d) a first fluid transfer means, having first and second positions, and which is associated with the first switching means for directing flow to or away from a second motor, the first transfer means having ports defining a flow path therethrough, the ports thereof being closed to the second motor while allowing flow to bypass through the first transfer means when the first switching means is in its first position, the ports thereof being open to the second motor when the first switching means is in its second position so as to permit flow to the second motor;
 - e) a second fluid transfer means, having first and second positions, and which is associated with the second switching means for directing flow to or away from a third motor, the second transfer means having ports defining a flow path therethrough, the ports thereof being closed to the third motor while allowing flow to bypass through the second transfer means when the second switching means is in its first position, the ports thereof being open to the third motor when the second switching means is in its second position so as to allow flow to the third motor;

f) flow is directed between the inlet, the second motor and to the outlet when the first switching means is in its second position and the second switching means is in its first position, and flow is directed between the inlet, the third motor and to the outlet when the first switching means is in its first position and the second switching means is in its second position; and

g) the flows passable through the first and second transfer means being routed into and out of those respective transfer means when the first or second switching means is in the second position so as to not require a valve associated with the second and third motor to stop flow from passing through the other of the second or third motor while maintaining a flow path to the outlet.

2. The invention of claim 1 wherein:

the flows which are passable through the first and second fluid transfer means, respectively, and which are routable into and out of those transfer means when the first and/or second switching means is in the second position, respectively, each include only one valve therealong which provides an open flow path to and from its respective motor to reduce loss in pressure across that flow path, thereby reducing loss in its efficiency while maintaining an ability to dissipate momentum of a device moved by the motor when that motor is no longer supplied by fluid passing through its respective transfer means and preventing movement of flow into one of the second and third motors when the other of the second and third motors is operating.

3. The invention of claim 2 wherein:

the first and second positions of the switching means and the fluid transfer means indicate a "closed" and "open" position, respectively.

4. The invention of claim 3 wherein:

the first and second switching means are solenoid operated directional control valves, and the first and second fluid transfer means are pilot operated directional control valves.